

June 2, 2021

Ms. Marlene Dortch
Secretary, Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: ET Docket No. 19-138, FCC 20-164 "Use of the 5.850-5.925 GHz Band" Further Notice of Proposed Rulemaking

Dear Ms. Dortch,

The American Association of State Highway and Transportation Officials (AASHTO) is pleased to provide comments on the Federal Communication Commission's (FCC) "Use of the 5.850-5.929 GHz Band" (ET Docket No. 19-138, FCC Docket No. 20-164, Further Notice of Proposed Rulemaking (FNPRM)), published in the Federal Register on May 3, 2021. Representing all 50 states, the District of Columbia, and Puerto Rico, AASHTO serves as a liaison between state Departments of Transportation and the federal government.

AASHTO and its members have been at the forefront of the development and deployment of connected and automated vehicles that have tremendous potential in significantly improving the safety of our surface transportation system as well as the mobility and accessibility for people. Paramount to the state DOTs is both eliminating the nearly 37,000 fatal vehicle crashes which occur on our roadways each year as well as the safe deployment of connected and automated vehicles. Unfortunately, with this notice and the significant reduction in the capacity of the transportation safety spectrum for connected vehicle technologies, the FCC has vastly reduced the effect that State DOTs can have on reducing these fatalities. And, furthermore, it is disappointing to AASHTO that the focus of the FCC is first and foremost on supporting the profit-making capability of the private sector companies which will pay nothing to use this spectrum while infrastructure owners and operators will have to spend even more public dollars to vacate and switch to a new and unproven technology.

As we stated previously, in addition to the safety benefits of connected vehicle technologies, there are economic benefits as well. With this notice, the United States will now be at a competitive disadvantage in the development of connected vehicle technologies compared with Europe and Asia as those countries surge forward. Our goal as a nation should have been

to be a leader in advancing transportation technology for the efficient and safe movement of freight and passenger transportation. The elimination of a significant portion of the transportation safety spectrum for unlicensed use will likely have a short-term economic benefit for the telecom companies, but it will absolutely set the United States back by allowing other countries to bypass us and develop more advanced transportation technology systems, crippling our standing in the world economy.

To put it succinctly, AASHTO believes that the FCC decision to permit unlicensed devices to operate in the lower 45-megahertz portion of the band at 5.850-5.895 GHz leaving ITS operations in the upper 30-megahertz portion of the band at 5.895-5.925 GHz was wrong and misguided. While the FCC has made the decision to reduce the capacity of the spectrum for ITS operations, they should be prepared to find and allocated new spectrum capacity for ITS purposes in order to further enable the deployment of connected and automated vehicles that will ultimately save lives and improve mobility.

AASHTO's comments on specific aspects of the FNPRM are focused on four key points:

1. **State DOTs Must be Compensated for Immediate and Future Financial Impacts**—We articulate the need for the FCC to reduce and ameliorate the financial impact the FCC Report and Order will have on current infrastructure owners and operators.
2. **More Time is Needed to Transition to C-V2X Technologies**—We demonstrate the specific need of infrastructure owners and operators to be provided with more time to transition out of the current lower 45 MHz and to then switch to the C-V2x technology.
3. **Additional Bandwidth is Needed to Enable ITS Applications**—We argue for the FCC to allocate additional bandwidth for ITS applications as a replacement the loss of the lower 45 MHz.
4. **Interference Issues and Concerns Have Not Been Addressed**—We show that there is still a significant amount of concern about the interference that has not yet been addressed but needs to be.

AASHTO appreciates the opportunity to provide these comments on the FNPRM that is based upon the flawed and misguided decision taken by the FCC in November 2020. We look forward to working with our partners at the USDOT, other associations, and private sector on the further development and deployment of the life-saving technologies that will be enabled by connected vehicle technologies and hope that FCC will decide to support us by better enabling the deployment of life saving vehicle and infrastructure-based technologies that will keep people from being killed and seriously injured on the US surface transportation system.

If you would like to discuss the issues raised in this letter, please contact Matthew Hardy, Ph.D., AASHTO's Program Director for Planning and Performance Management at (202) 624-3625.

Sincerely,

A handwritten signature in blue ink that reads "Victoria F. Sheehan". The signature is written in a cursive style with a large initial "V".

Victoria Sheehan

President, American Association of State Highway and Transportation Officials
Commissioner, New Hampshire Department of Transportation

At the state level, there are many efforts underway. In Utah, the Utah DOT (UDOT) has invested effort and resources to plan, develop and deploy connected vehicle technology. Over the past six years, Utah has invested \$2.3 million in the deployment of DSRC in the 5.9 GHz band. Importantly, these systems are producing measured, positive results. In addition UDOT has existing contracts underway, valued at \$15.0 million, to develop and deploy additional connected vehicle systems and technologies. Funding is in place for further system expansions; \$10.1 million in the next fiscal year. They currently have 131 intersections and 102 fleet vehicles with DSRC equipment installed and operating, and another 165 intersections and 90 vehicles slated for operation this year. These installations represent over 25% of all state-owned traffic signals in Utah. These are not pilot deployments, but are in a fully operational, permanent environment.

A similar experience can be found in Tennessee where the state DOT has spent nearly \$5 million in the planning, design, and deployment of connected vehicle technologies. The locations include the I-24 Smart Corridor, MLK Smart Corridor, CMAQ deployment in Chattanooga and Franklin, pilot deployments in Memphis and Knoxville, and general research and training throughout the state. Utah and Tennessee are but two of the more than 34 states where millions of public dollars have been spent to fund the development and deployment of connected vehicle technologies but will go to waste due to the action of the FCC.

The FCC Report and Order essentially wipes out all of this public investment such that private companies can now use the spectrum at no cost in order to earn a profit. The cost for vacating the lower 45 MHz and restructuring use of the remaining 30 MHz is a capricious exercise of FCC prerogative for which the incumbents incur all costs in spite of no advantages relative to their existing use of the band. Replacing DSRC deployments in a 75 MHz band with C-V2X in a 30 MHz band is not a mere exchange of competing and interchangeable technologies. C-V2X implementations have not yet demonstrated successful deployments of all the applications that have thus far used DSRC. Reducing the available bandwidth and usable channels requires another round of development and deployments to verify and validate applications. Incumbents have expended significant resources in building capabilities using that band and are now being forced to scrap and replace existing functioning deployments with new developments and deployments of unproven technologies.

AASHTO's members do not believe this is fair or equitable and that infrastructure owners and operators located throughout the US who are now saddled with these sunk costs should be reimbursed. In particular, we ask that the FCC develop and implement a program to compensate all infrastructure owners and operators for the costs incurred by this forced transition in communications and technology associated with:

- Replacement bandwidth and communications capacity for the loss of functionality in reduction in the 5.9 GHz band from 75 MHz to 30 MHz (or less, with OOB from adjacent bands).
- Replacement of proven DSRC roadside and on-board equipment with still-developing and long lead-time C-V2X. Costs to be compensated must include the licensed agency roadside units as well as unlicensed on-board units that are rendered unusable with this band reallocation. At the outset, these costs must be understood to include the cost of C-V2X technology and application development to the level demonstrated by DSRC at the time of the mandate. The technology

and applications have to be redesigned to meet the DSRC-equivalent performance specifications while moving from the full 75 MHz and seven DSRC channels to 30 MHz and a single C-V2X channel.

- Modification of existing applications and systems that are specific to DSRC-based equipment, including the life-cycle costs of application redesign, procurement, field changeout, and redeployment of applications. Costs to be compensated must include the full life cycle costs of redeployment—planning, development, procurement, integration, construction and installation, testing, evaluation, and transition to operations.
- Retention and retraining of personnel and cost associated with institutional retooling in workforce training and retention in support of those life cycle activities.

AASHTO and its members request that the FCC establish a timely mechanism to provide funding to licensees to implement the requirements of the FCC Report & Order and transition out of the bands. First, the calculation of costs must include all of the development and deployment costs of the mandated transition. Second, costs need to include costs of transitioning out of the band such as to restore functionality with the newly mandated C-V2X technologies prior to conclusion of the minimum two-year switchover period. Finally, the compensation plan must include an aspect to provide money to state DOTs prior to incurring these costs. Most States DOT's cannot purchase equipment and execute consultant agreements without funding in hand—their systems do not allow it. A compensation plan needs to provide funds in advance and not simply as a reimbursement.

2. More Time is Needed to Transition to C-V2X Technologies

This R&O and FRPRM have made uninformed and unwarranted assumptions regarding the complexity and time needed for transitions: 1) from 75 to 30 MHz; and 2) from DSRC to C-V2X for the ITS Safety band. As described previously on the costs associated with developing and deploying connected vehicle technologies, this transition is not simply a replacement of equivalent technological black boxes. The replacement process will require planning, development, procurement, integration, construction and installation, testing, evaluation, and transition to operations. First, the proposed 12-month period in which to vacate ITS operations in the lower 45 MHz of the band is minimally sufficient and cannot be further reduced without potentially significant loss of application functionality. Second, the proposed 2-year period in which to convert all ITS applications to C-V2X risks the loss of application functionality.

The experience of our members is that neither the 12 months to vacate the current channels nor switching from DSRC to C-V2X is sufficient and nor can they be consider as isolated actions that occur one after another. In California, Caltrans' experience indicates that a minimum of two years' time frame is needed for testing C-V2X technology in performing radio coverage studies, interference studies, integration with existing transportation infrastructure, porting the existing applications from DSRC to C-V2X, and training the personnel. This two-year period is needed in order to engineer, procure, test, and deploy C-V2X-based technologies and applications, even if applications and supply chains using the reduced 30 MHz 5.9 GHz ITS band are proven and available. However, is highly unlikely that C-V2X based technologies will be proven or available.

AASHTO and its members request that the FCC provide a minimum of three for infrastructure owners and operators to transition from the 75 to 30 MHz as well as transition from DSRC to C-V2X. A longer time is absolutely needed for transition of operations out of the lower 45 MHz of the band and from

DSRC to C-V2X technologies. These mandated moves require adaptation of virtually every aspect of connected vehicle deployments to date. The time needed for the transitions must be sufficient to design and implement applications at fully equivalent service levels to those already being provided and planned with DSRC in the full 75 MHz band and 24 months is not sufficient given the process that all states must use to plan and spend limited public funds.

Furthermore, we propose that the process of vacating operations in the lower 45 MHz of the ITS band include a six-month checkpoint on testing to determine whether levels of OOB interference are sufficiently low that operations can be moved to the upper 30 MHz without undue loss of application functionality. Lack of such a determination would trigger an automatic reevaluation at another six month interval until such time as the question is resolved. If there are still questions to be resolved prior to the end of the three year transition period, a six-month extension of the transition period would be provided.

3. Additional Bandwidth is Needed to Enable ITS Applications

The need for bandwidth to accommodate applications in the ITS Safety Band has been an ongoing concern in development and pilot deployments for many years. This has been further aggravated by needs to support emerging applications and cooperative driving automation. The reduction from 75 to 30 MHz challenges the viability and efficacy of applications already deployed and any intent for functional enhancements. In fact, more than 85% of comments submitted in response to the original FCC NPRM expressed various reasons why 30 MHz was not sufficient for safety applications.³ Objective and subjective arguments were presented, by a broad spectrum of transportation safety experts, engineers, private companies, and industry associations.

In early 2021, the Intelligent Transportation Society of America (ITS America) established a Future of V2X Working Group that includes representatives from IOOs, automotive manufacturers, and technology companies, to evaluate the potential effect of the FCC's reallocation on the types of messages and V2X applications that could be deployed.⁴ The Working Group drafted a preliminary application map that attempts to show the message types and applications that will likely be enabled in the more limited 30 MHz spectrum environment - and the message types and applications that would likely be lost in such a scenario.

The group evaluated numerous V2X applications based on several inputs: spectrum requirements, stakeholder priority, and likely safety benefit. Spectrum requirements were calculated based on assumptions about the number of vehicles within communication range, packet size, repetition rate, activity factors, spectral efficiency, and channel utilization. Stakeholder priority was assessed both through informal discussion among Working Group members and a limited survey of IOO priorities for applications. The likely safety benefit of an application was assessed through informal discussion and the NHTSA Vehicle Safety Communications Project final report evaluating the potential safety benefits of V2X applications. It is important to note that advanced V2X applications, including those that rely on collective perception messages (CPM), maneuver coordination messages (MCM), and personal safety messages (PSM) will likely be lost. The result of the analysis conducted through the ITS America working group is simple: *the 30 MHz band specified in the R&O will be insufficient to accommodate the*

³ <http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP23-10-V2XCommunicationsMarch2020Update.pdf>

⁴ <https://itsa.org/wp-content/uploads/2021/01/ITS-America-30-MHz-Application-Map-1-27-21.pdf>

applications deployed and in development. These applications need dedicated bandwidth to assure their efficiency and security.

The FCC also wrongfully asserts in the R&O that individual vehicle safety sensors and systems can replace many cooperative applications. While the FCC's assertion on that onboard systems exceed some functions originally envisioned for DSRC, it cannot be said that onboard systems achieve all such functions. Dynamic, non-standard situations like incidents and work zones are especially hard to interpret and navigate by onboard systems without a feed of current information. Likewise, the problem of onboard vision systems reading and interpreting signals and message signs with multiplexed LEDs has not been solved.

AASHTO and its members request that the FCC include consideration for allocating dedicated bandwidth elsewhere in the spectrum. Given the extent to which the 30 MHz will significantly limit the available capacity for V2X applications to operate, AASHTO believes that more bandwidth is needed, in addition to the given 30 MHz bandwidth to deploy Safety and mobility applications successfully and with required robustness. Restoration of functionality lost by the FCC's action and preparation for future applications necessitates that FCC consider allocation of alternative bandwidth dedicated to ITS safety and mobility efforts to allocate additional bandwidth for ITS applications in replacement for the loss of the lower 45 MHz in the 5.9 band.

4. Interference Issues and Concerns Have Not Been Addressed

A major issue with the FCC's R&O for reallocating the 5.9 GHz band is that it makes no provisions for channel separation and limiting interference from the unlicensed band to the single 10 MHz DSRC band or from the 20 MHz C-V2X band into the DSRC band. OOBE with no buffer or guard bands are likely to create significant interference in each of the bands. Although definitive testing is yet to be done for this configuration, preliminary analysis and bench tests indicate that the arrangement is unlikely to prove satisfactory.

In March 2020, USDOT released the Draft Report on USDOT DSRC-U-NII-3 Sharing & Spectrum Interference Testing.⁵ Unlike FCC Report TR 17-006 which used prototype U-NII-4 devices, devices that don't yet exist commercially, this USDOT report considered the impacts of existing U-NII-3 Wi-Fi devices, if they are allowed to share or operate adjacent to DSRC in unlicensed spectrum. This report was intended to serve as a baseline for the existing wireless environment, serving as a pre-cursor to the Phase II U-NII-4 testing prescribed in NPRM 16-68, and evaluating co-channel radio performance. In the process of conducting this testing, adjacent channel interference was also observed and recorded.

Most significant of the findings was that a U-NII-3 Wi-Fi access point, located as far as 100 meters away or more, and even if operated inside a building, or on an adjacent channel, caused significant interference with DSRC:

This represents a consequential impact to safety given that DSRC was designed to provide situational awareness in a safety zone defined by a 300-meter radius around a vehicle. Co-

⁵ Arnold, James A., et. al, USDOT Spectrum Sharing Test Report: Effects of Unlicensed-National Information Infrastructure-3 (U-NII-3) Devices on Dedicated Short-Range Communications (DSRC), Draft, January 2020, <https://www.transportation.gov/sites/dot.gov/files/2020-03/Draft%20report%20on%20USDOT%20DSRC-U-NII-3%20Sharing%20%26%20Spectrum%20Interference%20Testing%20.pdf>

channel sharing with Wi-Fi or any unlicensed radio service with similar power and duty cycle as Wi-Fi will not be possible without a robust and reliable sharing mechanism that defers to the high priority safety messages. Similarly, a reallocation of channels would need to provide guard bands to protect both radio services from adjacent channel interference from the other.

The report goes on to provide several additional findings related to both co-channels sharing, and adjacent channel interference caused by Wi-Fi that, if present, would severely impact the safety capabilities of DSRC.

AASHTO requests that the FCC take all steps necessary to ensure that OOB interference issues and concerns are comprehensively and conclusively addressed before fully enacting the order to vacate the lower 45 MHz of the ITS Safety Band. The FCC's R&O does acknowledge that OOB interference has the potential to affect operations in the reduced 30 MHz band remaining for ITS applications. It fails, however, to provide conclusive evidence that the interference will remain in specified limits and not compromise the integrity of communications in that band. It is incumbent on the FCC to provide this assurance to minimize and protect the 30 MHz from OOB interference for operations.